The genus *Aradus* in Scotland and the confusion of *corticalis* (L.) with *A. betulae* (L.), Hemiptera-Heteroptera, Aradidae

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The present distribution and biology of the bark bug *Aradus betulae* (L.) has been summarised recently (Bland, *et al.* 1999). I had already searched through the extensive insect collection of the University of Glasgow, Hunterian Museum (Zoology) for aradid material for this review, or so I thought, and had been able to supply some records. So it was with some astonishment recently that I opened a drawer of an old cabinet and saw a large number of preserved specimens of bark bugs from Rannoch. Also, as they were labelled *Aradus corticalis* (L.) they might have been the source of the statement in Southwood & Leston (1959) that this species is 'perhaps incorrectly (known) from Scotland'. The occasion presented an opportunity to sort out the small confusion as to which species do occur here.

The specimens in this forgotten batch are actually *A. betulae* (L.), all from Rannoch and collected in July and August, 1917 by J.J.F.X. King. There are 56 males, 66 females and 10 nymphs (plus the exuviae of six penultimate instars) and indeed are the basis of the contemporary account as to the supposed discovery of *A. corticalis* by King (1917). At that time *betulae* was unknown in Britain, not being officially added until some time later (Harwood, 1921). The differences between *betulae* and *corticalis* are small and the two are not easily distinguished. Although King collected extensively in the New Forest he does not appear ever to have found true *corticalis*. There are as yet still no specimens for comparison in the university collection, reflecting its rarity and occurrence only in the south of Britain. King casually labelled his Scottish material *corticalis* on the scrap of paper inside the box and did not realise the possible confusion between the two species even when *betulae* was reported from the same place a few years later (Harwood, 1921). So it appears that *corticalis* does not occur in Scotland as the only published record is based on a misidentification.

The account by King (1917) corroborates some of the notes (Bland, 1999) on the biology of *betulae*. King found his specimens 'walking or resting among the lichens that covered the tree' and only a small number were under bark. They may have been feeding or seeking food when collected, which took place over a period of nearly three weeks between 21st July and 17th August. Perhaps the bugs only retreat under bark when not feeding or during cold and wet weather. He found them all on a single tree illustrating quite dramatically that these bark bugs tend to cluster. Encountering large numbers in this way may be explained by an observation by Massee (1960). He described seeing lots of a sibling species *A. depressus* (Fabr.) flying around recently felled oak and birch that were exuding sap. This could result in a population building up rapidly with subsequent generations remaining in *situ* while a food supply remains in a suitable condition.

In King's sample of *betulae* there is a roughly equal sex ratio between males and females and it is probable that none were in the process of mating. It is possible to suggest this because King was quite diligent in labelling insects found *in copula*; numerous examples are found so marked throughout his collection in all the various orders that he collected. Neither does he mention any mating process (King, 1917) which supports the probability that he did not observe it. Mating may occur at a different time of day or season. He did bring some individuals back alive to Glasgow where the nymphs became adult in September. The 6 cast nymphal skins of penultimate instars in the collection must represent these. There are a small number of whole nymphs; 2 penultimate, 6 antepenultimate and two more significantly smaller that may be of an earlier stage.

Oddly, the discovery of the most widely distributed bark bug of this genus in Britain, *A. depressus*, did not occur in Scotland until much later (Massee, 1964) in Tomich, Strath Glas, Inverness-shire. This species had been found also in the same year in Rannoch but was not announced until a decade later (Crowson, 1974). It has since been found twice elsewhere, at Fort Augustus, Glen Tariff, 30 May 1982 by I.M. White and Spey Bridge, 3 May 1981 by E.C. Pelham-Clinton, according to data on specimens in the National Museums of Scotland. So the first notice of finding *Aradus* bark bugs in Scotland can still be credited to King, as has been claimed (anon. 1926). The relative obscurity of provincial journals may explain how King's record evaded early attempts to synthesize geographical distribution as neither Butler (1923) nor Bedwell (1945) listed *corticalis* as being Scottish. Even when Massee (1955) did notice the record it was then rapidly queried (Southwood & Leston, 1959) but the specimens to unravel the story were not available until now.

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The stone loach in Orkney

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The stone loach *Barbatula barbatula* is a small freshwater fish rarely attaining a length of more than 10 cm. It is not only found in running water but also in lochs and is mainly nocturnal hiding during the day under stones or in dense weed. On mainland Scotland it has been recorded as far north as Loch Lomond in the west and the Aberdeen Dee in the east (P. Maitland pers. comm.).

While carrying out a survey in 1990 of nursery streams of brown trout *Salmo trutta* in Orkney, using electro-fishing, Douglas Sinclair found a well established population of stone loach in the burn of Hillside (HY320226) and its tributary the Burn of Lushan (HY336230) in the West Mainland of Orkney. This was the first reported record of this species in the county. He was also undertaking monthly gill netting of lochs: this included the Loch of Hundland (HY295260), into which these burns flow. At no time did he catch any stone loach, although they are not easily collected by (gill) nets but he did trap some three-spined sticklebacks *Gasterosteus aculeatus*. Since then, the stone loach appears to have extended its range. In 1997, while searching under stones in shallow water in the Loch of Hundland, 2 were caught using a hand net and 4 others seen. This was along a 20 metre stretch of the loch shore: the fish ranged in length from 2.5 to 8 cm. In the same year anglers reported discovering stone loach in the stomachs of brown trout caught in the loch. By 1999 it had spread, via a connecting burn, into the Loch of Boardhouse (HY270260).

It is not known how this fish came to be so much further north than its recorded range in Scotland but the most probable explanation would seem to be human introduction. The stone loach has apparently been in the Burn of Hillside since at least 1988 when, according to R. Andrew, it was seen during a field meeting of the junior Orkney Field Club, although not reported at the time. At present it seems to be thriving and it will be interesting to see if, in the future, it is found in burns and lochs elsewhere in Orkney.

I am very grateful to Professor Peter Maitland, of the Fish Conservation Centre, for information on the distribution of the stone loach in Scotland and to Douglas Sinclair for details of his survey findings.

Migrating river lampreys at the tidal weir, Glasgow

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Lampreys are primitive eel-like fish. The larval stages are blind and live in river sediments before metamorphosing into eyed adults which (usually) migrate to sea to feed and mature before returning to rivers to spawn and die. The adults have a mouth sucker armed with small teeth and feed on other fish - rasping the flesh and sucking blood.

Three species of lamprey occur within the Clyde basin area (Maitland, 1980a) and all are on the "Long List of globally threatened or declining species" (HMSO, 1995). These peculiar fish are rarely caught by anglers and sightings, especially of the sea-going species, are few and far between.

The largest species, the sea lamprey (*Petromyzon marinus*) is known to breed in the upper Leven and possibly the Clyde (Doughty, 1994,1996), whilst the river lamprey (*Lampetra fluviatilis*) has been recorded occasionally from rivers in Lanarkshire, Ayrshire, Renfrewshire, Kintyre and possibly Arran (Gibson, 1981 and *pers. comm.*) The population of river lampreys in the River Endrick has been studied by Maitland *et al.* (1983, 1994) and is unusual as the adults remain in freshwater, venturing only as far as Loch Lomond where they feed on powan (Maitland,1980b); Gibson & Mitchell, 1986). The brook lamprey (*Lampetra planeri*) which is very similar in appearance to the river lamprey, though usually smaller, is widespread in rivers and streams throughout the area but does not feed as an adult nor migrate to sea.

During routine trawling for flounder in the Clyde